MATERIAL SAFETY DATA SHEET

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SRM Number: 4919H
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SRM Name: Strontium-90 Radioactivity Standard
Date of Issue: 9 February 2000

SECTION I. MATERIAL IDENTIFICATION

Material Name: Strontium-90 Radioactivity Standard

Description: SRM 4919H consists of radioactive strontium-90 chloride, non-radioactive strontium chloride, and hydrochloric acid dissolved in 5 mL of distilled water. The resulting solution is 4 % hydrochloric acid.

Other Designations: **Strontium** in **Hydrochloric Acid** (aqueous hydrochloric acid; hydrogen chloride; muriatic acid)

Name	Chemical Formula	CAS Registry Number
Hydrochloric Acid	HCl	7647-01-0

DOT Classification: Hydrochloric Acid, UN1789

Manufacturer/Supplier: Available from a number of suppliers

SRM 4919H is a radioactive material with a massic activity of approximately 4 kBq·g^{-1}. The hazard information supplied in this MSDS is for the Chemical Hazard Only! For the hazard documentation concerning the radioactive material, refer to the SRM certificate.

SECTION II. HAZARDOUS INGREDIENTS

Hazardous Components	Nominal Concentration (%)	Exposure Limits and Toxicity Data
Hydrochloric Acid	4	ACGIH TLV-TWA: 5 mg/kg or 7.6 mg/m^3
		OSHA Standard Air Ceiling: 5 mg/kg or 7.6 mg/m^3
		Human, Inhalation: LC_{LO}: 1 300 mg/kg/30 min
		Human, Inhalation: LC_{LO}: 3 000 mg/kg/5 min
		Mouse, Intraperitoneal: LD_{50}: 40 142 µg/kg

NOTE: This material contains strontium at a nominal concentration of 0.01 %, which is below the reportable limit (0.1 % for carcinogens, 1 % for all other health hazards) required by OSHA according to 29 CFR 1910.1200(g)(2)(i)(C)(1).

SECTION III. PHYSICAL/CHEMICAL CHARACTERISTICS

Hydrochloric Acid
Appearance and Odor: A colorless liquid; pungent, irritating odor
Relative Molecular Mass: 36.46
Density: 1.01 (4 % hydrochloric acid)
Solubility in Water: Soluble
Solvent Solubility: Soluble in alcohol and benzene

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point: Not applicable **Method Used:** Not applicable **Autoignition Temperature:** Not applicable

Flammability Limits in Air (Volume %): **UPPER:** Not applicable
LOWER: Not applicable

Unusual Fire and Explosion Hazards: Hydrochloric acid is a negligible fire hazard when exposed to heat and/or flames. Hydrochloric acid may react with the evolution of heat on contact with water; the acid may release toxic, corrosive, flammable, or explosive gases.

Extinguishing Media: Use regular dry chemical, carbon dioxide, water, or regular foam.

Special Fire Procedures: Firefighters should wear a self-contained breathing apparatus (SCBA) with a full face piece in the pressure demand or positive mode and other protective clothing.

SECTION V. REACTIVITY DATA

Stability: **__X__ Stable** **_____ Unstable**

Conditions to Avoid: Avoid heat, moisture, and combustible materials. This material may ignite or explode on contact with combustible materials.

Incompatibility (Materials to Avoid): Hydrochloric acid is incompatible with cyanides, metals, amines, bases, metal cyanides, oxidizing materials, acids, halo carbons, combustible materials, halogens, and metal salts.

See Section IV: *Unusual Fire and Explosion Hazards*

Hazardous Decomposition or Byproducts: Thermal decomposition of hydrochloric acid may release acid halides.

Hazardous Polymerization: **_____ Will Occur** **__X__ Will Not Occur**

SECTION VI. HEALTH HAZARD DATA

Route of Entry: **X** **Inhalation** **X** **Skin** **X** **Ingestion**

Health Hazards (Acute and Chronic): Hydrochloric Acid: Hydrochloric acid may be fatal if inhaled, swallowed, or absorbed through the skin. This material causes burns and is extremely destructive to the tissue of the mucous membranes and upper respiratory tract, eyes, and skin. Inhalation may be fatal as a result of spasm, inflammation, and edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Hydrochloric acid also causes severe burns.

Medical Conditions Generally Aggravated by Exposure: Pre-existing skin conditions may be aggravated by the acid.

Listed as a Carcinogen/Potential Carcinogen (Hydrochloric Acid):

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens		X
In the International Agency for Research on Cancer (IARC) Monographs		X
By the Occupational Safety and Health Administration (OSHA)		X

EMERGENCY AND FIRST AID PROCEDURES:

Skin Contact: Remove contaminated shoes and clothing. Rinse affected area with large amounts of water followed by washing the area with soap and water. Watch for chemical irritations and treat them accordingly. Obtain medical assistance if necessary.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 min. Obtain medical assistance.

Inhalation: If inhaled, move the victim to fresh air. If breathing is difficult, give oxygen; if the victim is not breathing, give artificial respiration. Obtain medical assistance if necessary.

Ingestion: If ingestion occurs, wash out mouth with water. **DO NOT** induce vomiting. Obtain medical assistance immediately.

TARGET ORGAN(S) OF ATTACK: Lungs, upper respiratory tract, skin, and teeth

SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material Is Released or Spilled: Notify safety personnel of spills. Spills should be handled according to radioactive spill procedures.

Waste Disposal: Follow all federal, state, and local laws governing disposal of radioactive materials.

Handling and Storage: Provide general and local explosion proof ventilation systems to maintain airborne concentrations below the TLV. Provide approved respiratory apparatus for non-routine or emergency use. Use an approved filter and vapor respirator when the vapor or mist concentrations are high. Wear gloves and chemical safety glasses where contact with the liquid or high vapor concentrations may occur. An eye wash station and washing facilities should be readily available near handling and use areas. The sample container should be handled by persons qualified to handle both radioactive materials and strong acid solutions.

> **NOTE:** Contact lenses pose a special problem; soft lenses may absorb irritants and all lenses concentrate them. **DO NOT** wear contact lenses in the laboratory.

This material should be stored and used at a temperature between 5 °C and 65 °C.

SECTION VIII. SOURCE DATA/OTHER COMMENTS

Sources: MDL Information Systems, Inc., MSDS *Hydrochloric Acid*, June 2, 1999.
Merck Index, 11th Ed., 1989.
The Sigma Aldrich Library of Chemical Safety Data, Ed. II, 1988.